

APPLICATION OF HYPERSPECTRAL IMAGERY FOR DETECTING INVASIVE AQUATIC AND RIPARIAN SPECIES IN THE SACRAMENTO-SAN JOAQUIN DELTA

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The University of California, Davis, the California Department of Boating and Waterways, and the California Department of Food and Agriculture cooperated on a project to evaluate the use of hyperspectral imagery for detecting invasive aquatic and riparian species in the Sacramento-San Joaquin Delta in California using 3 m HyMap hyperspectral imagery. The HyMap sensors capture 126 discrete bands of electromagnetic radiation in the visible, near infrared, and short wave infrared wavelengths (400 to 2500 nanometers). The target invasive aquatic weeds were the emergent water hyacinth (*Eichhornia crassipes*), the submerged Brazilian waterweed (*Egeria densa*), and the riparian weeds purple loosestrife (*Lythrum salicaria*) and perennial pepperweed (*Lepidium latifolium*). Ten flightlines covering approximately 400 km² were acquired on July 1, 2003. 164 flightlines covering approximately 3,400 km² were acquired from June 25 through July 7, 2004. There were sufficient differences in the spectral signatures of the invasive species to allow us to distinguish them from native vegetation and develop maps of their occurrence. Data were analyzed using linear spectral mixture analysis for aquatic weeds and mixture tuned matched filtering for the riparian weeds on the levees. The results show the target weeds were mapped with a classification accuracy of 90.6% when compared to 2003 sample sites. Preliminary results show that the submerged Brazilian waterweed can be distinguished from Coontail (*Ceratophyllum demersum*), American pondweed (*Potamogeton nodosus*), and the Common waterweed (*Elodea canadensis*). The results indicate that hyperspectral imagery can be used to detect, map, and quantify the distribution of the target weeds within the Sacramento- San Joaquin Delta.